

**This Page Is Inserted by IFW Operations
and is not a part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- **BLACK BORDERS**
- **TEXT CUT OFF AT TOP, BOTTOM OR SIDES**
- **FADED TEXT**
- **ILLEGIBLE TEXT**
- **SKEWED/SLANTED IMAGES**
- **COLORED PHOTOS**
- **BLACK OR VERY BLACK AND WHITE DARK PHOTOS**
- **GRAY SCALE DOCUMENTS**

IMAGES ARE BEST AVAILABLE COPY.

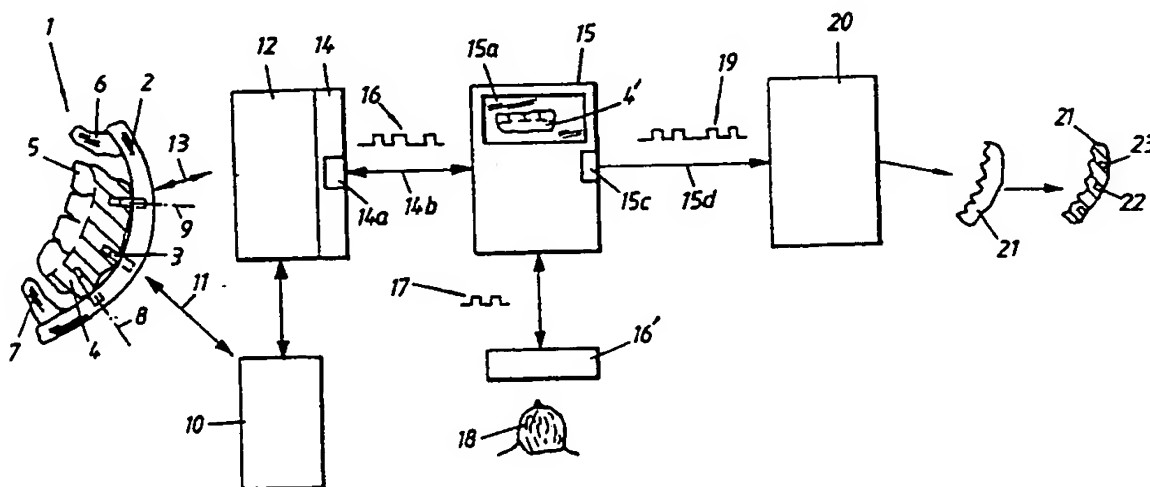
**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A61C 13/00	A1	(11) International Publication Number: WO 98/51232 (43) International Publication Date: 19 November 1998 (19.11.98)
(21) International Application Number: PCT/SE98/00835 (22) International Filing Date: 7 May 1998 (07.05.98) (30) Priority Data: 9701824-6 16 May 1997 (16.05.97) SE (71) Applicant (for all designated States except US): NOBEL BIO CARE AB [SE/SE]; P.O. Box 5190, S-402 26 Göteborg (SE). (72) Inventors; and (75) Inventors/Applicants (for US only): BÄCK, Tomas [SE/SE]; Krokslätt Parkgata 13, S-431 68 Mölndal (SE). CARLSSON, Lennart [SE/SE]; Matildebergsgatan 36, S-431 38 Mölndal (SE). PETERSSON, Anders [SE/SE]; Munkebäcksgatan 32, S-416 54 Göteborg (SE). (74) Agent: OLSSON, Gunnar; Nobel Biocare AB, P.O. Box 5190, S-402 26 Göteborg (SE).		(81) Designated States: AU, CA, JP, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>

(54) Title: METHOD AND ARRANGEMENT FOR PRODUCING ELONGATE SUPPORT ELEMENT AND PRODUCT, AND USE OF THE SUPPORT ELEMENT



(57) Abstract

A method and arrangement for producing elongate support element (4) for replacement structure (9) in jaw (2). The support element is applied to implants in the jaw with great accuracy of fit. Identification information (16) is delivered to computer equipment (15) in which supplementary information (17) is input. With the aid of the said information, the computer equipment extracts control data (19) for milling equipment (20) which mills out the support element from a blank. With the aid of the milling information (19), the milling equipment executes the support element according to the shape determined in the computer equipment. In addition, the information comprises details on the configurations of the said seats and the positioning in the support element material/blank.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Larvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MR	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MT	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

Method and arrangement for producing elongate support element and product, and use of the support element.

5

TECHNICAL FIELD

The present invention relates inter alia to a method for producing elongate support element with associated seats for replacement structure in human
10 body (jaw), via which seats the support element can be applied to implants and/or to spacers on these implants. The longitudinal axes or centre axes of the seats connect with or are parallel to the longitudinal axes or centre axes of the implants in order to satisfy
15 set accuracy of fit requirements which can be about 2/100 mm. The method starts from the stages of identification and possible modelling of the dental situation in question, supplying information, extracted from the identification and modelling, to computer
20 equipment, operating the computer equipment to use the supplied information and further information input to the computer to simulate and determine the structure of the support element in or at the replacement structure, extracting, from the computer equipment, milling
25 coordinates information or milling coordinates data used for controlling the milling of a blank in milling equipment, transmitting the milling coordinates information and milling coordinates data to the milling equipment and controlling the milling work equipment to
30 produce the support element from the blank.

The invention also relates to an arrangement for producing elongate support element with associated seats for replacement structure in human body/jaw, via which seats the support element can be applied to
35 implants and/or to spacers on these implants, where the centre axes of the seats are arranged to connect with or be parallel to the centre axes of the implants so that set accuracy of fit requirements are satisfied. The arrangement comprises identification members and
40 possibly modelling members for identification and,

respectively, modelling of the respective dental situation. Also included is computer equipment for receiving information extracted from the identification and modelling. Also included are first transmission
5 members for transmitting the extracted information to the computer equipment, with which, on the one hand, the structure of the support element and the positioning in or at the replacement structure can be simulated and can be determined by means of the
10 extracted information and further information input to the computer equipment, and, on the other hand, milling coordinates information or milling coordinates data for controlling the milling of a blank in milling equipment can be executed with the aid of the said
15 extracted and input information. Also included are second transmission members for transmitting the milling coordinates information (data) to the milling equipment for controlling the latter to produce from the blank.

20 The invention also relates to a product in the form of elongate support element for replacement structure (for example, dental bridge) for the human body, where the support element is designed with seats via which the support element can be applied to
25 implants and/or to spacers on these implants. In accordance with the above, the centre axes of the seats connect with the centre axes of the implants so that fixed accuracy of fit requirements result.

The invention also relates to the use of
30 recessing directly in the material of a blank in conjunction with the production of a dental product from the blank in milling equipment.

STATE OF THE ART

35 The features discussed in the introduction are known per se in the production of dental products, and also to some extent in connection with dental products in the form of elongate support elements of the said type. Reference is made to, inter alia, Swedish patents

9304042-6 and 9402351-2. It is also known per se to make recesses in dental products by means of so-called direct milling of the product material.

5 DESCRIPTION OF THE INVENTION

TECHNICAL PROBLEM

In connection with the abovementioned methods and arrangements for producing dental products in the form of support elements, there are requirements for very great accuracy in the seat application. The required accuracy is, in accordance with the above, at least about 2/100 mm, and the requirements are set in order to be able to satisfy exact fitting in the jaw or equivalent. Poor fitting gives rise to stresses in the dentine or equivalent and causes discomfort and pain and even collapse of the bone in question, at least in the longer term. This has entailed comparatively technically complicated methods and arrangements for seat applications. The said methods include, inter alia, seat production by means of electro-erosion, in which a produced model is used as electrode part. The hitherto proposed methods and arrangements can include production of modules which are welded together (by laser welding) to form the final support element. Before the modules are put together, seat application can take place separately in one or more modules, for example by means of mechanical or optical measurement. However, the result of welding is a nonhomogeneous material in which the strength varies in the support element. Cavities may possibly arise in the material on account of the melt zone not penetrating down deep enough. When grinding or surface-machining the support element to adapt the shape, such cavities can become exposed, which means that the exactness or fit accuracy requirements cannot be satisfied. It has also been proposed to produce support parts by means of casting processes. In casting, there is the problem that the material may buckle upon cooling. The surface fineness

in the contact seats can never be better than the grain size of the mould material. Particularly in the case of titanium casting, the molten metal can react chemically with the mould material, which can mean that the outermost material layer, about 1 mm thick, is heavily oxidized or forms an alloy, cf., for example in titanium casting, in the form of zirconium oxide in which the surface layer will consist of an alloy of titanium and zirconium. The strength will vary in the support element and there may be problems in obtaining support part elements with acceptable strength. In both welding and casting, the chemical composition of the surface therefore varies. In welding, the weld seam differs from the base material, and, in casting, ground areas differ from the raw cast surface. When ceramic is then to be baked onto the surface to form the tooth replacement, the adhesion varies greatly across the surface, the result of this being that there may be difficulties in obtaining products which are durable in the long term and which are suitable for implanting in, for example, the jaw. There is therefore a need for methods and arrangements and finished support elements, and the use of methods known per se, which solve the abovementioned problems. The main object of the present invention is to provide a solution to these problems.

SOLUTION

That which can principally be regarded as characterizing a method according to the invention is that the milling equipment, with the aid of the said milling information or milling data, in addition to executing the support element shape determined in the computer equipment from the blank, can also be used for control in order to mill out the said seats directly in or out of the blank/support element material.

The arrangement according to the invention can principally be regarded as being characterized in that the milling coordinates information or milling coordinates data is designed, in addition to executing

the support element shape determined in the computer equipment from the blank using the milling equipment, also to be used to control the milling equipment to shape and position the said seats directly in the
5 blank/support element material using the information likewise set in the computer equipment.

A product according to the invention can principally be regarded as being characterized in that the support element is made of homogeneous material and
10 in that each seat wall is executed directly from the homogeneous support element material.

In embodiments of the inventive concept for the product, each seat wall can consist of a surface ground directly in the homogeneous material. The product can
15 also have a material strength around each seat which essentially corresponds to the material strength of the rest of the support element material. In a further illustrative embodiment, each seat wall is formed directly from the support element material without
20 intermediate layers of material compositions or material alterations. Each seat wall thus has the same chemical composition as the rest of the support element material.

A use according to the invention can be
25 characterized in that the recessing is used for receiving the seats in the product in the form of a support element included in tooth replacement structure. The said seats must in this case have fixed accuracy of fit requirements in order to be applied to
30 implants located in the human body and/or to spacers on these implants.

In one embodiment for recessing which is used for forming a seat in the support element with milling equipment, this milling coordinates information is
35 supplied in the form of milling coordinates data executed in database equipment and attributable to identification data on the design of the tooth replacement structure and supplementary data fed to the computer equipment. The information supplied from the

computer equipment to the milling equipment can be integrated on condition that it contains milling data on the support part design and the seat design/the seat positions.

5

ADVANTAGES

By means of the measures proposed above, support elements with very accurate seat positions can be produced at a relatively low cost. The advantages are considerable compared to casting, for example. In this case, a material independence is achieved, which means that the production can be carried out using titanium, gold or other tissue-compatible material. The seats are integrated in the material and better precision is obtained in the seat positions in relation to the cast support elements. The invention also affords advantages compared to partially welded bridges. In this case too, a clear material independence is achieved, and it is possible to avoid weld seams which impair the strength and require more comprehensive re-grinding. In the present case, very good and uniform strength can be obtained throughout the whole material, and the need for re-grinding is reduced.

25

DESCRIPTION OF THE FIGURES

A presently proposed embodiment of the method, the arrangement, the support element and the use will be described hereinbelow with reference to the attached drawing, in which:

30

Figure 1 shows a block diagram of the structural parts of the arrangement, and the various manufacturing stages in the method,

Figure 2 shows, in vertical cross-section, an example of a support element, and

35

Figure 3 shows in vertical cross-section, and in an enlarged view compared to Figure 2, a seat formation in a support element.

DETAILED EMBODIMENT

In Figure 1, reference number 1 indicates a dental situation in the form of a mandible 2. The dental situation is such that a replacement part in the form of a dental bridge is to be applied to implants 3 incorporated in the jaw. The designs of the implants with spacers and the like are already well known and will not be described here. In the dental situation, the dental bridge has been illustrated in its final state so as to indicate, in this application, a tooth replacement example which is appropriate to the invention. The replacement structure or the dental bridge will, in the final state, comprise a support part 4 and, applied to this, a tooth replacement material which is symbolized by 5. The tooth replacement structure is placed between existing teeth 6 and 7 on the patient. The implants have individual inclinations on their centre axes, and the centre axes for two of the implants are indicated by 8 and 9. The dental situation 1 in question which is to be read off on commencement of the work thus includes the human jaw 2, the implants 3 and possibly also surrounding teeth 6 and 7. In connection with the production of the support element 4, modelling equipment can be used which is symbolized by 10 in the figure. The cooperation between the situation and the equipment 10 is symbolized by arrows 11.

In accordance with the invention, the dental situation is to be read off using identification equipment 12 which can also be of a type known per se. The reading can be effected in various ways known per se, for example by stereophotography, scanning of the outer form, etc. The scanning of the outer form can be performed using scanning needles, optical light beams, etc. The identification function is symbolized by 13 in the figure. The identification in question leads to a conversion to electrical information signals. This conversion takes place, in the illustrative embodiment, in conversion equipment 14. The conversion equipment

also comprises first transmission members 14a by means of which information on the identified situation can be transmitted to computer equipment 15 of a type known per se in the context known per se. According to the illustrative embodiment, the transmission is done digitally and identification data is indicated by 16. This identification data is thus received in computer equipment 15 in a manner known per se. The computer equipment 15 also includes a terminal 16 by means of which supplementary information is input to the computer equipment. In the illustrative embodiment, the supplementary information is digital and has been symbolized by 17 in Figure 1. The computer equipment comprises memory equipment and CPU which can receive and store, and, respectively, execute the received information 16 and 17. With the aid of the last-mentioned information or data 16 and 17, the support element 8 can be simulated on the computer screen 15a, for example. This applies also to the tooth replacement structure 9 as such. By interaction with a user 18, the simulated support part 4' can be shaped in a manner known per se for optimum construction in the tooth replacement part 9. Programs for identifying shape, positions, etc., are available on the market and can be used in connection with the illustrative embodiment.

With the aid of the said information 16 and 17 and the simulation which has been performed, milling coordinates information can thus be executed in the computer equipment 15. Examples of milling coordinates data are shown by 19 in the figure. The said milling coordinates data are fed to machining equipment 20 of a type known per se. The said machining equipment consists of a mill which can mill from a blank 21 not only the outer shape 21 of the support part, but also the seats 22, 23 by means of which the support part 21 is to be anchored on the implants 3 and/or on spacers (not shown) on these implants. The inclinations and the positions of the said seats are produced using the said

known programs in the computer equipment and are thus part of the said milling coordinates data 19.

In Figure 2, the positions and inclinations of the seats are shown enlarged in relation to Figure 1. In Figure 2, two of the seats have been given reference labels 22 and 23 (cf. Figure 1). The centre axes of the seats are indicated by 24 and 25, respectively. These centre axes must be adapted with great precision to the corresponding axes of inclination of the implant (cf. the centre axes 8 and 9 in Figure 1).

Figure 3 shows that equipment known per se can be used for making a seat 26 in the support part material 27. In Figure 3, a mill is indicated by 28. In addition, a grinding member is indicated by 29. The mill can thus mill out the recess 26, after which the seat wall 26a can be re-ground using the member 29. The known equipment 28 for making a hole can thus be used for making the seat 26 in the case according to Figure 1. The milling equipment 20 can work in a manner known per se. In Figure 1, second transmission members are shown by 15c for transmitting the information 19 to the machining equipment 20. This transmission can be done in a manner known per se and is symbolized by 15d. Thus, for example, the transmission can be done by the telephone and/or computer network, for example via the international computer network, the internet. The transmission between the first transmission members 14, 14a and the computer equipment can take place on a fixed connection, for example when the said equipment is integrated or set up in the same locality. However, the transmission, which has been symbolized by 14b in Figure 1, can also take place via the telephone and/or computer network, for example via the said international network, the internet. Alternatively, one or both transmissions can take place with the aid of cassettes which are sent between the localities in question.

The invention is not limited to the embodiment shown above by way of example, but can be modified

- 10 -

within the scope of the appended patent claims, and the inventive concept.

PATENT CLAIMS

1. Method for producing elongate support element
5 (21) with associated seats (22, 23) for replacement
structure (9) in human body (jaw) (2), via which seats
(22, 23) the support element can be applied to implants
(or to spacers on these implants), where the
longitudinal axes (centre axes) of the seats connect
10 with or are parallel to the longitudinal axes (centre
axes) of the implants in order to satisfy set accuracy
of fit requirements (2/100 mm), the method comprising
the stages of:
- a) identification (13) and possible modelling (11)
15 of the dental situation (1) in question,
 - b) supplying information (16) extracted from stage
a) to computer equipment,
 - c) operating the computer equipment to use the
supplied information (16) and further information (17)
20 input to the computer equipment to simulate and
determine the structure (4, 4') of the support element
in or at the replacement structure (9),
 - d) extracting, from the computer equipment (15),
milling coordinates information (data) (19) used for
25 controlling the milling of a blank in milling equipment
(20),
 - e) transmitting the milling coordinates
information (data) (19) to the milling equipment (20),
 - f) controlling the milling equipment to produce
30 the support element from the blank,
characterized in that
 - f) the milling equipment, with the aid of the said
milling information (data), in addition to executing
the support element shape determined in the computer
35 equipment from the blank, can also be used for control
in order to mill out the said seats (22, 23) directly
from the blank/support element material.
2. Arrangement for producing elongate support
element (4, 21) with associated seats for replacement

structure (9) in human body (jaw) (2), via which seats the support element can be applied to implants (or to spacers on these implants) (3), where the centre axes (24, 25) of the seats are arranged to connect with or
5 be parallel to the centre axes (8, 9) of the implants so that set accuracy of fit requirements (2/100 mm) are satisfied, and where the arrangement comprises identification member (12) and possibly modelling member (10) for identification (13) and, respectively,
10 modelling (11) of the respective dental situation, computer equipment (15) for receiving information (16) extracted from the identification and modelling, and first transmission members (14) for transmitting the extracted information to the computer equipment (15),
15 with which, on the one hand, the structure (21) of the support element and the positioning in or at the replacement structure can be simulated and can be determined by means of the extracted information and further information (17) input to the computer
20 equipment, and, on the other hand, milling coordinates information (data) (19) for controlling the milling of a blank in milling equipment (20) can be executed with the aid of the said extracted and input information, and second transmission members (15a) are arranged for
25 transmitting the milling coordinates information (data) to the milling equipment (20) for controlling the latter to produce the support element from the blank, characterized in that the milling coordinates information (data) (19) is designed, in addition to
30 executing the support element shape determined in the computer equipment from the blank using the milling equipment, also to be used to control the milling equipment to shape and position the said seats (22, 23) directly in the blank/support element material (27).

35 3. Product produced using the method and the arrangement according to Patent Claims 1 and 2, respectively, in the form of elongate support element (21) for replacement structure (9), for example in the form of a dental bridge, for the human body, where the

support element is designed with seats (22, 23) via which the support element can be applied to implants (3) and/or to spacers on these implants, where the centre axes (24, 25) of the seats connect with the centre axes (8, 9) of the implants so that fixed accuracy of fit requirements (of at least about 2/100 mm) result, characterized in that the support element is made of homogeneous material (27) and in that each seat wall (26a) is executed directly from the homogeneous support element material (27).

4. Product according to Patent Claim 3, characterized in that each seat wall consists of a surface (26a) ground directly in the homogeneous material.

5. Product according to Patent Claim 3 or 4, characterized in that the material strength around each seat has essentially the same material strength as the rest of the support element material (27).

6. Product according to Patent Claim 3, 4 or 5, characterized in that each seat wall (26a) is formed directly from the support element material (27) without intermediate layers of material compositions or material alterations.

7. Product according to any of Patent Claims 3 - 6, characterized in that each seat wall (26a) has the same chemical composition as the rest of the support element material (27).

8. Use of recessing (26) directly in the material (27) of a blank in conjunction with the production of a dental product from the blank in milling equipment (20), characterized in that the recessing is used for receiving the seats (22, 23) in the product in the form of a support element (4) included in tooth replacement structure (9), the seats (22, 23) of which with set accuracy of fit requirements (at least about 2/100 mm) are to be applied to implants located in the human body and/or to spacers on these implants.

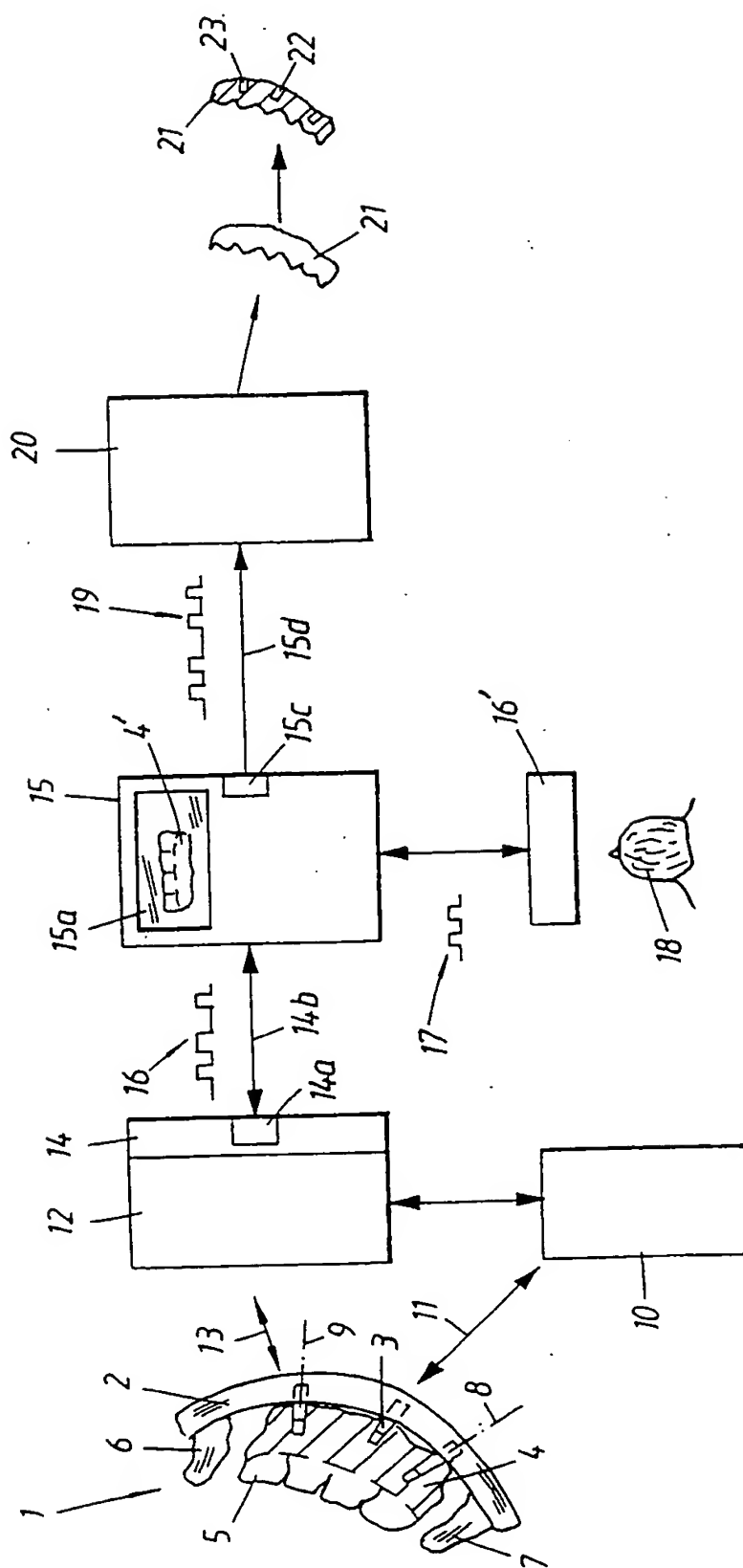
9. Use according to Patent Claim 8, characterized in that the recessing (26) is used for forming a seat

in the support element in milling equipment (20) which is fed milling coordinates information in the form of milling coordinates data (19) executed in computer equipment (15) and attributable to identification data 5 (16) and supplementary data (17) fed to the computer equipment (15).

10. Use according to Patent Claim 8 or 9, characterized in that the recessing (26) is used for forming a seat in support element (21) in milling 10 equipment (20) which is fed integrated milling data (19) on the support element design and seat design and the seat positions in the support element.

1/2

Fig. 1



2/2

Fig. 2

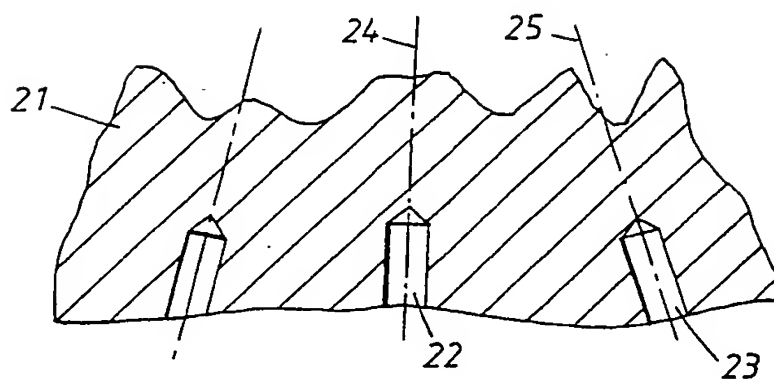
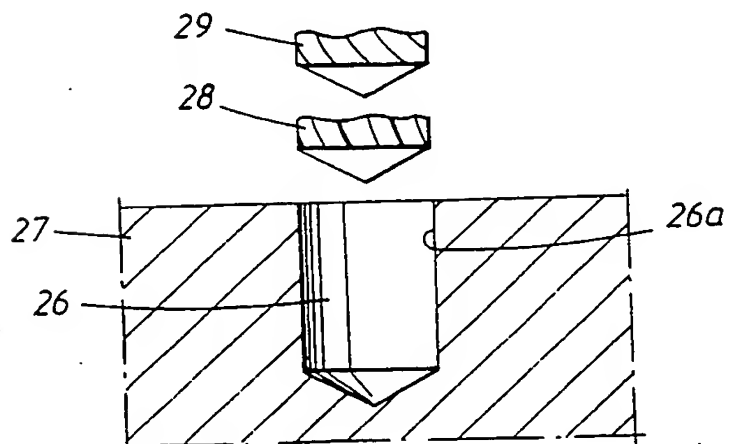


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/00835

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A61C 13/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9515731 A1 (NOBELPHARMA AB), 15 June 1995 (15.06.95) --	1-10
A	WO 9601083 A1 (NOBELPHARMA AB), 18 January 1996 (18.01.96) -----	1-10

☐

Further documents are listed in the continuation of Box C.

☒

See patent family annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

19 August 1998

Date of mailing of the international search report

24 -08- 1998

Name and mailing address of the ISA

Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer

Jack Hedlund
Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT
Information on patent family members

27/07/98

International application No.
PCT/SE 98/00835

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9515731 A1	15/06/95	AU 682083 B	18/09/97
		AU 1251695 A	27/06/95
		CA 2154478 A	15/06/95
		EP 0683647 A	29/11/95
		JP 8509150 T	01/10/96
		SE 502035 C	24/07/95
		SE 9304042 A	07/06/95
WO 9601083 A1	18/01/96	AU 2941995 A	25/01/96
		CA 2170780 A	18/01/96
		EP 0716584 A	19/06/96
		JP 9502640 T	18/03/97
		SE 503073 C	18/03/96
		SE 9402351 A	05/01/96